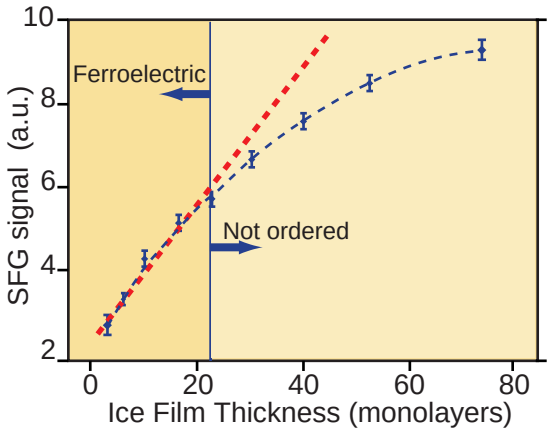
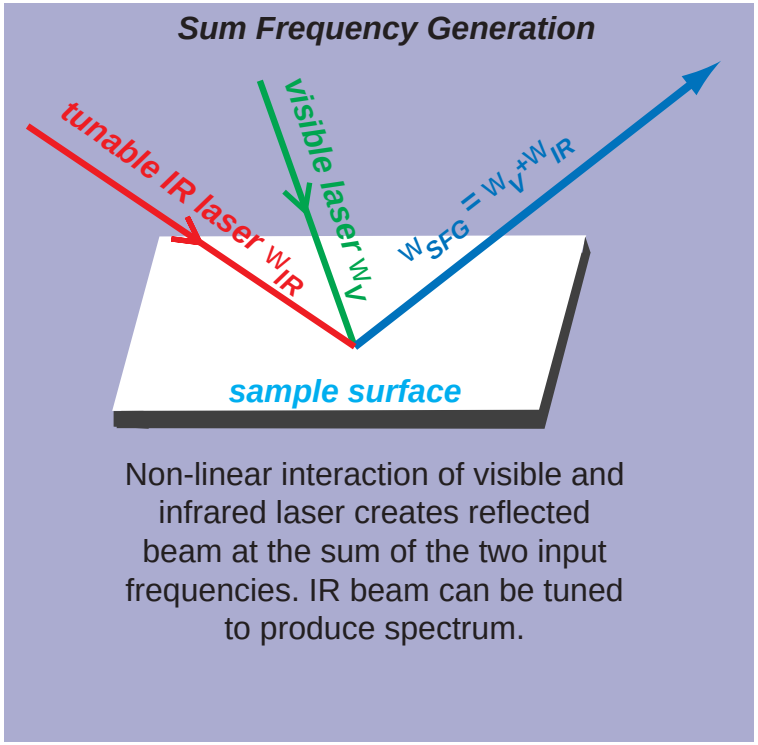
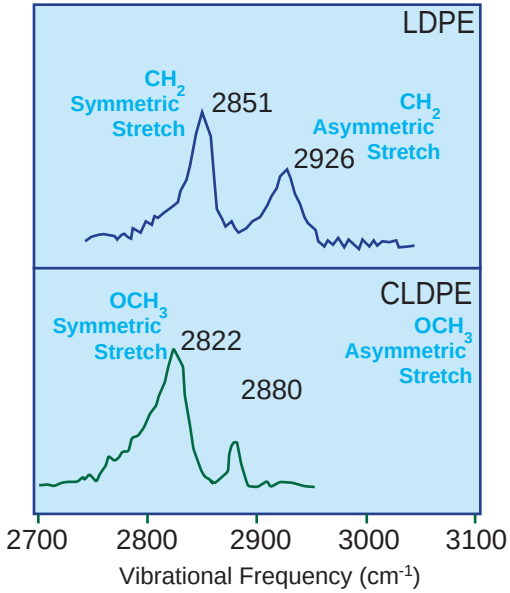
Long Standing Questions of Ice, Catalyst, and Polymer Surfaces Elucidated by New Surface Science Technique



***Ferroelectric Ice*—**Linear dependence of SFG signal indicates ferrolectric ordering of up to 20 monolayers.

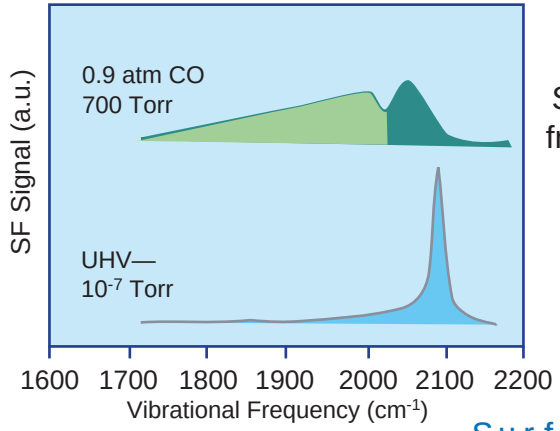


Non-linear interaction of visible and infrared laser creates reflected beam at the sum of the two input frequencies. IR beam can be tuned to produce spectrum.



Differences in Polymer Surfaces— Surface-specific vibrational spectrum changes from that of simple CH_2 groups (above, LDPE) to that characteristic of OCH_3 groups (below, commercial LDPE). The surface methoxy groups are responsible for decreased surface friction and plastic modulus.

***CO on Pt(111)*—**At ultra-low pressure, peak is at 2095 cm^{-1} (CO bound to Pt(111) "bridge" sites). At realistic near-atmospheric pressure, this peak disappears and a new peak at 2045 cm^{-1} (CO "squeezed" into defect and "atop sites") and a broad background extending to 1700 cm-1 ("incommensurate" CO atoms absorbed out of registry with the Pt(111) surface) are observed. Thus, the bridge sites are not "active sites" for CO oxidation under normal reaction conditions.



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